CLAIMS

WHAT IS CLAIMED:

1. A method, comprising:

determining, for a specified etch tool and a specified etch recipe, across-substrate variations in etch rate when performing said etch recipe in said etch tool;

forming a process layer above a substrate;

performing an ion implantation process to implant ions into said process layer formed above said substrate, wherein at least one parameter of said ion implantation process is determined based upon said determined across-substrate variations in etch rate; and

performing said etch recipe on said process layer formed above said substrate after said ion implantation process is performed.

2. The method of claim 1, further comprising performing said ion implantation process comprised of said determined at least one parameter on a process layer formed above at least one subsequently processed substrate prior to performing said etching recipe on said process layer formed above said at least one subsequently processed substrate.

3. The method of claim 1, wherein said etch rate is determined based upon measurements made as said etching process is being performed.

4. The method of claim 1, wherein said etch rate is determined based upon measurements made after said etching process has been completed.

5. The method of claim 1, further comprising establishing a relationship between said at least one implantation parameter and an etch rate for said process layer and said specified etch recipe.

6. The method of claim 5, wherein an implantation dose is varied so as to substantially compensate for said across-substrate etch rate non-uniformities on the basis of said relationship.

7. The method of claim 1, wherein an implantation energy is selected so that a peak concentration of implanted ions is within a thickness of said process layer.

8. The method of claim 1, wherein said ions are selected so as to have a diffusivity that is less than a predefined threshold at temperatures of subsequent manufacturing processes.

9. A method, comprising:

determining, for a specified etch tool and a specified etch recipe, across-substrate variations in etch rate when performing said etch recipe in said etch tool;

determining, based upon said across-substrate variations in etch rate, at least one parameter of an ion implant process to be performed on a process layer to be subjected to said etch recipe in said etch tool; and

performing said ion implant process comprised of said determined at least one parameter on said process layer.

10. The method of claim 9, further comprising performing said etch recipe on said process layer after said ion implant process has been performed.

11. The method of claim 9, further comprising performing said ion implant process comprised of said determined parameter on process layers formed above subsequently processed substrates prior to performing said etch recipe in said etch tool on said process layers.

12. The method of claim 9, wherein said determined at least one parameter of said ion implant process is determined to compensate for said across-substrate variations in etch rate.

13. A method, comprising:

determining, for a specified etch tool and a specified etch recipe, across-substrate variations in etch rate when performing said etch recipe in said etch tool;

determining, based upon said determined across-substrate variations in etch rate, at least one parameter of an ion implant process that produces across-substrate variations in implant regions formed by performing said implant process; and

performing said ion implant process on at least one process layer to be subjected to said etch recipe in said etch tool.

14. The method of claim 13, further comprising performing said ion implant process on additional process layers that are to be subjected to said etch recipe in said etch tool.

15. The method of claim 13, wherein said etch rate is determined based upon measurements made after said etch recipe has been completed.

16. The method of claim 13, further comprising establishing a relationship between said at least one implantation parameter and an etch rate for said at least one process layer and said specified etch recipe.

17. The method of claim 16, wherein an implantation dose is varied so as to substantially compensate for said across-substrate etch rate non-uniformities on the basis of said relationship.

18. The method of claim 13, wherein an implantation energy is selected so that a peak concentration of implanted ions is within a thickness of said at least one process layer.

19. The method of claim 13, wherein said ions are selected so as to have a diffusivity that is less than a predefined threshold at temperatures of subsequent manufacturing processes.

20. A method, comprising:

determining, for a specified etch tool and a specified etch recipe, a local etch rate at a plurality of locations across a first substrate subjected to an etch process to remove portions of a layer of specified material formed on said first substrate; and

implanting ions into a layer of specified material formed on a subsequently processed substrate prior to subjecting said subsequently processed substrate to an etch

process with said specified etch recipe in said specified etch tool, wherein one or more implantation parameters are adjusted based on said local etch rate obtained from said first substrate.

21. The method of claim 20, further comprising establishing a relationship between said one or more implantation parameters and an etch rate for said specified material layer and said specified etch recipe.

22. The method of claim 21, wherein an implantation dose is varied so as to substantially compensate for local etch rate non-uniformities on the basis of said relationship.

23. The method of claim 20, wherein an implantation energy is selected so that a peak concentration of implanted ions is within a thickness of said specified material layer.

24. The method of claim 20, wherein said ions are selected so as to have a diffusivity that is less than a predefined threshold at temperatures of subsequent manufacturing processes.

25. The method of claim 20, wherein said local etch rate is determined for a plurality of first substrates to obtain an averaged local etch rate.

26. The method of claim 20, wherein said local etch rate is determined based upon measurements made as said etching process is being performed.

27. The method of claim 20, wherein said local etch rate is determined based upon measurements made after said etching process has been completed.

28. A method, comprising:

forming a first layer of a specified material on a first substrate;

etching said first layer using a specified etch tool and a specified etch recipe;

forming a second layer of said specified material on at least one of a second substrate and said first substrate;

implanting a specified ion species according to specified implantation parameters into said second layer;

etching said second layer using said specified etch tool and said specified etch recipe; and

determining a difference between a first etch rate in etching said first layer and a second etch rate in etching said second layer at a predefined location on said first and second substrates.

29. The method of claim 28, further comprising forming a plurality of second layers and changing at least one implantation parameter value when implanting said specified ion species in each of said plurality of second layers to determine a plurality of etch rate differences.

30. The method of claim 29, further comprising determining a local etch rate at a plurality of predefined locations of said first substrate.

31. The method of claim 30, further comprising selecting suitable values of said at least one implantation parameter for each predefined location so that an expected difference of the etch rate at said plurality of predefined locations is within a predefined range when said specified ion species are implanted into said second layer according to said selected suitable values.

32. The method of claim 31, further comprising etching at least one of said second layers, determining said local etch rates and fine-tuning said selected parameter values on the basis of said local etch rates.

33. An advanced process system, comprising:

an etch rate measurement device configured to determine a local etch rate at least at some different locations on a substrate;

an implantation tool; and

a control unit operatively connected to said etch rate measurement device and said implantation tool, said control unit being configured to obtain said local etch rates and to control at least one implantation parameter of said implantation tool on the basis of said local etch rates.

34. The advanced process system of claim 33, wherein said control unit comprises a parameter determining section configured to assign a value of at least one implantation parameter to a specified location of said substrate that is expected to substantially exhibit a specified local etch rate.